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ABSTRACT

This study explores the usefulness of a creativity construct for arts education. It is hypothesized that an arts orientation is a valid personality construct, that this orientation is correlated with contrasting cognitive skills, and that these skills are manifested in creative behaviors. Sixty-five high school seniors were given the ACT Interest Inventory; tests of logic, insight, divergent and creative thinking; and a modified version of the Creative Behavior Inventory. Data were analyzed for the total group and a subsample of 35 logical thinkers. Results confirm correlation of the arts orientation with five domains of artistic behavior and three cognitive skills (logic, divergent and creative thinking, but these skills only correlated with two domains of artistic behavior (literature and art). Discussion centers on fundamental implications for arts curricula and methods of instruction. The data point to the possibility of a prerequisite or threshold level of logic necessary for creative thinking. If arts are to be taught as creative activities to students in the general curriculum, it is clear that many students will not possess the prerequisite reasoning skills. It would seem far better for general curriculum arts courses to develop critical thinking and expressive problem solving skills, and for specialized elective courses to develop creative thinking (discipline based art education). Twenty-five references and five tables of study data conclude the document. (Author/PPB)

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An Arts Orientation, Cognitive Skills and Creative Behaviors

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Abstract

This study explored the usefulness of the creativity construct for arts education. It was hypothesized that the arts orientation is a valid personality construct, that this orientation is correlated with contrasting cognitive skills, and that these skills are manifested in creative behaviors. Sixty-five high school seniors were given the ACT Interest Inventory; tests of logic, insight, divergent and creative thinking; and a modified version of the Creative Behavior Inventory. Data were analyzed for the total group and a subsample of 35 logical thinkers. Results confirmed correlation ($p < .05$) of the arts orientation with five domains of artistic behavior and three cognitive skills (logic, divergent and creative thinking), but these skills only correlated with two domains of artistic behavior (literature and art). Discussion centered on fundamental implications for arts curricula and methods of instruction.

An Arts Orientation, Cognitive Skills and Creative Behaviors

The purpose of this study is to explore the value of the creativity construct for education in the arts, which are broadly conceived to include literature, music, theater and dance as well as the visual arts. The most promising line of inquiry begins with the work of Hudson (1966, 1968) who discovered that different cognitive styles identified by Guilford (1956) appear to be associated with career choices of adolescents. Convergent thinkers, who are good at solving problems with correct answers, tend to choose coursework in science or the classics while divergent thinkers, who are expressive in their solutions to open-ended problems, tend to choose coursework in biology or the arts.

As Hudson predicted, these findings have had implications for both the study of career choice and of originality. Research on vocational choice and creativity has united in the study of an "arts orientation," or the vocational personality of creative artists. Holland (1985) has done extensive theoretical work to define the preferences of the artistic type of individual in contrast to those of five other vocational types. Basically, the

arts orientation entails preference for "ambiguous, free and unsystematized activities" over those that are explicit, systematic and ordered. This orientation has recently been linked to skill at divergent thinking (Rump, 1982; McCrae, 1987), bringing the research full circle. Divergent thinking seems to imply an arts orientation, and an arts orientation seems to imply divergent thinking.

There are a number of reasons why this finding has not made an impact on education in the arts. First, the research has not appeared in contexts readily available to arts educators in the United States. This strand of creativity research had its origin in England and Australia, and only recently has made its appearance in American journals. The journals themselves are in the field of psychology and not arts education. Second, the studies are couched in the terms and methodology of science. There are few links in the research with the language of the arts. Third, the relationship between an arts orientation and divergent thinking is modest and variable.

This strand of research will hopefully come to the attention of arts educators insofar as it is perceived to serve artistic disciplines. To accomplish this end, the languages of science and the arts need to be mediated by a

concept such as "expressive problem solving." Fluent response to divergent-thinking problems has been associated with the expressiveness of drawings by children (Singer and Whiton, 1971; Wallach, 1985), and "expressive problem solving" appears to be the cognitive genus of which divergent thinking is a species. A tougher problem, not solved by a mediating concept, is the lack of strength and stability in the relationship between an artistic orientation and expressive problem solving. Other cognitive skills may be related to the artistic personality and involved in truly creative thinking.

Problem-finding skills, for example, have been found by Getzels and Csikszentmihalyi (1976) to predict ratings of art students' experimental drawings for originality and aesthetic value. Similar problem-finding variables have been linked to the originality of essays written by middle school students (Moore, 1985), extending the study of problem finding to school-age children and the language arts. Problem-finding skills are described by Csikszentmihalyi and Getzels (1988) as "metacognitive" in the sense that they involve unconscious or preconscious affective and motivational elements as well as logic. The author (Wakefield, 1988) has labelled some of these

noncognitive elements sympathetic understanding of the problem, imagination, and intuition. These skills appear to result in an imaginative identification of the artist with the artistic problem. Specifically, an artist might unconsciously see himself as a chunk of glass in a drawing, communicating and yet "distorting" his environment through his art (Getzels and Csikszentmihalyi, 1976, p. 145), or a poet might interpret her baby's wail as a symbol of self-preservation (Perkins, 1981, p. 66).

Problem-finding skills seem to be related to the arts orientation at least as strongly as expressive problem-solving skills, and a coordination of the two types of cognitive skill results in a systematic approach to the problem of creative thinking. If characteristics of problems and their solutions are ranged along continua from "closed" to "open," and these continua are arranged orthogonally, what is obtained is a theoretically-defined field which may be divided into four areas or quadrants. The closed-problem, closed-solution situation calls for convergent or evaluative thinking; the open-problem, closed-solution situation calls for insightful thinking; the closed-problem, open-solution situation calls for expressive problem solving; and the open-problem, open-solution

situation calls for creative thinking.

The continuous (not dicotomous) model permits systematic interpretation of a set of test scores to obtain a cognitive profile of the individual with an arts orientation, based on group results. Further correlation of cognitive skills with creative behaviors in each artistic domain may reveal similarities and differences between cognitive profiles for each of the arts. The hypotheses of the present study were:

1) that the arts orientation is a valid personality construct, expressing itself in creative behaviors;
2) that the arts orientation is correlated with contrasting cognitive skills, which include logical, divergent and creative thinking; and
3) that these relationships manifest themselves through a correlation of the same cognitive skills with creative behaviors.

Method

Subjects

To obtain a general sample, subjects were recruited from five twelfth-grade English classes. Eighty-nine seniors participated in the study, but due to incomplete tests and the invalidation of four interest surveys, only 65

(28 M and 37 F) became subjects. Ability levels of subjects were estimated from the levels of the English classes. Twenty subjects were in advanced-placement English, 29 were in college-bound, and 16 in "general English." Of the 20 AP English students, all had participated in other AP classes, and half had taken AP calculus. Seven had won awards as seniors in district, regional, or state-wide poetry, short story or essay competitions. At the other extreme, one subject in college-bound and four in general English had failed a grade at some point during their education.

Instruments and Measures

Permission was obtained from the ACT Program to use the Unisex Edition of the ACT Interest Inventory (UNIACT). This 90-item instrument surveys interests in six areas corresponding to Holland's types. According to the technical manual, the Creative Arts scale measures interest in "activities such as painting, designing, singing, dancing, and writing;" and "artistic appreciation of such activities" (Lamb and Prediger, 1981, p. 1). The other five scales measure interest in social services, business contact, business organization, technical careers, and science. When scores indicate an extreme bias in one response category ("dislike,""indifferent,""like"), the

examinee is told that interests are unclear at this time. In this manner, response bias due to insincerity can be controlled. According to the ACT Program, the criteria for designating unclear interests exclude 5% of a normal sample. These criteria were applied, and the data sets of four participants (4%) were excluded from the study.

Four cognitive skills tests (one to represent each theoretically-defined type of thinking skill) were designed. A logic test (presenting a closed-problem-and-solution situation) was constructed from conditional and class reasoning items for grades 7-12 published by the UCLA Center on Evaluation (1971). This fifteen-minute test consisted of two practice items and forty test syllogisms (valid or invalid), two items for each of 12 principles of conditional reasoning and 8 principles of class reasoning. An insight test (presenting an open-problem, closed-solution situation) was constructed from puzzle problems adapted from various sources. This fifteen-minute test consisted of one practice and twenty test items in multiple-choice format.

A divergent-thinking test (presenting a closed-problem, open-solution situation) was constructed from three items calling for lists of uses for 1) a quarter, 2) a popsicle stick, and 3) a paper cup other than their usual

use (purchase something, hold a popsicle, hold liquid). This twelve-minute test was preceded by a practice item and was scored for fluency, or total number of responses. A creative-thinking test (presenting an open-problem-and-solution situation) was constructed from three items calling for similar lists of uses for 1) a metal, 2) a wooden, and 3) a paper object named by the examinee. This twelve-minute test was not preceded by a practice item, but it directly followed the divergent-thinking exercise. Subjects were aware of time limits for all of the tests and for each test item in the open-ended exercises.

The instrument used to assess creative behaviors was a modified version of the Creative Behavior Inventory (Hocevar, 1979). The CBI is a 90-item survey of achievements in literature, music, crafts, art, and math or science. The instrument was modified to omit 15 unscalable items, to address achievements in grades 7-12, and to limit responses to three categories ("never," "once or twice," "three or more times"). Means, standard deviations, and scale reliability estimates for this and the other two instruments are reported in Table 1.

Procedures

Subjects were voluntarily recruited in English classes

over two days. On the first day, they took the UNIACT and were given divergent-thinking and creative-thinking tests. To control for the contamination of open-ended items by self-reports, creative-thinking items were relabelled "item invention," and no mention of creativity was made until the second day, when subjects filled out the modified CBI and were given the insight and logic tests. At the end of the second day, all participants were provided with Holland codes and examples of corresponding careers as a benefit of participation.

Data were analyzed for the total group, then a subgroup was formed of data sets for subjects who could be designated "logical thinkers." The cut-off criterion for this designation was established through the probability of receiving a specific score or higher by chance on the logic test. Since the binomial probability of scoring 26 or more correct out of 40 by chance is only about .04, a score of 26 on the logic test was accepted as meeting the .05 criterion for significance. The logic scores of 35 subjects met this criterion, and not surprisingly, 18 came from the AP group, 14 from the college-bound group, and only 3 from the lowest-level group. For comparative purposes, the results for logical thinkers are reported along with those for the total

group.

Results

The results specifically confirmed the hypotheses of 1) an artistic personality, and 2) the correlation of this personality with a specific set of cognitive skills, but only confirmed 3) selective relationships between cognitive skills and creative behaviors. Table 1 presents the means,

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Insert Table 1 about here

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standard deviations, and reliability estimates (alpha coefficients) for the study measures using the total group. Reliability coefficients (in parentheses) were also calculated for the cognitive skills tests using the sample of logical thinkers. For this subgroup, the reliability estimate of the logic test decreased, while the reliability of the divergent-thinking measure remained about the same, and the reliabilities of both the insight and creative-thinking measures actually increased.

The intercorrelations of the cognitive skills tests for both the total group and logical thinkers are reported in Table 2 (with values for the subgroup in parentheses).

Insert Table 2 about here

Of interest are the relatively high and stable correlations between logic and insight on the one hand and divergent and creative thinking on the other. Except for these two interrelationships, the generally significant pattern of correlations between cognitive skills found in the total group disappears within the subsample, signalling increased independence of the two types of scores with increased logical skill.

Table 3 reports the results of testing the hypothesis of a creative personality by correlating six personality orientations with five domains of creative behavior. The arts orientation is the only type which correlated

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Insert Table 3 about here

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positively and significantly with every domain of creative achievement (including science/math). The scientific type correlated significantly with two domains of creative behavior (performing arts and crafts), but neither value was highly significant. The business operations type correlated

negatively with achievements in two creative domains (literature and art), further confirming the construct validity of the arts orientation, which is averse to the explicit, systematic, and ordered activities associated with business operations.

Among logical thinkers, this pattern of significant relationships was enhanced. Correlations (not shown) between the arts orientation and all domains of creative behavior remained moderate (.31 - .39), with the highest correlation being between the arts orientation and achievement in art (.44, $p < .01$). Correlations between the scientific orientation and two types of achievement remained moderately significant, but the negative correlations between the business operations type and achievements in literature (-.40, $p < .05$) and art (-.52 $p < .01$) increased, as did the negative relationship between the artistic and business operations personalities (-.38, $p < .05$).

The results of correlating the six personality orientations with cognitive skills are reported in Table 4.

Insert Table 4 about here

Two clusters of significant relationships appeared, one

related to the arts and the other to the technical orientation. The arts orientation correlated significantly with logical, creative, and divergent thinking (in that order), as expected. Further, partial correlations were calculated to control for the effects of theoretically uncorrelated skills (i.e., logical and creative thinking) on each other. When the effect of creative thinking was partialed out of the relationship between the arts orientation and logic, a significant value (.27, $p < .05$) remained. When the effect of logic was partialed out of the relationship between the arts orientation and creative thinking, the residual value (.24) fell below significance. Logic, somewhat more than creative thinking, was found to exist independently in relation to the artistic type.

The pattern of expected and unexpected correlations was somewhat different for logical thinkers. The correlations between the arts orientation and both logic and divergent thinking fell just below significance (.27 and .29), but the correlation between the arts orientation and creative thinking remained about the same (.34, $p < .05$). The correlation between the technical type and creative thinking also fell below significance (.26), but the one between the technical orientation and divergent thinking

remained about the same (.35, $p < .05$). The only other significant findings were negative correlations between insight and two non-science orientations (service and business contact).

Table 5 presents the results of correlating the four cognitive skills with five measures of creative achievement. Three patterns were found. First, contrasting cognitive

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Insert Table 5 about here

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skills correlated with literary and artistic achievements, as expected. Second, all cognitive skills correlated significantly with scientific achievement. Third, no cognitive skill correlated significantly with achievements in three domains of behavior (music, performing arts, and crafts), with the exception of divergent thinking, which correlated significantly with achievement in crafts.

A somewhat different pattern of correlations was found for logical thinkers. For this subgroup, correlations between logic and creative behaviors fell far below significance (-.01 for literature and .18 for art), while the correlation between creative thinking and literature remained about the same, but that between creative thinking

and art increased (.45, $p < .01$). The correlations between divergent thinking and both literature and art remained about the same, but the correlation between divergent thinking and crafts (.19) fell below significance. Correlations of cognitive skills with achievement in science generally fell below significance, except that for insight (.33, $p < .05$), which remained stable. The correlation between divergent thinking and crafts (.19) fell below significance.

Discussion

The hypotheses of relationships between an arts orientation and both creative behaviors and contrasting cognitive skills were supported, despite only qualified support for hypothesized relationships between cognitive skills and creative behaviors. These results lead to two fundamental implications for education which concern arts curricula and teaching methods.

The implication for arts curricula can be approached through the discovery of a significant relationship between an arts orientation and logic for the total group, which diminished when scores were attenuated for evidence of logical thinking. This diminishing relationship might be attributed to the decreasing reliability of the logic

measure, but the decrease in reliability was so small that when correlations between the arts orientation and cognitive skills scores were corrected for changes in the reliability estimates of the skill scores (cf. Nunnally, 1970, p. 553), the corrected correlations were almost the same as the uncorrected ones. Attenuation in test scores cannot by itself account for the decreases in correlations reported after Table 4.

There is considerable evidence that points to another explanation for the decreasing correlations. Suppose that a prerequiste or "threshold" level of logic were necessary for creative thinking. This supposition would explain three types of changes in correlations when the logical subgroup was compared to the total group: the <u>increase</u> in the reliability of the creative thinking score (Table 1), the sharp drop in correlations between logic and creative or divergent thinking (Table 2), and similar (if not quite as dramatic) decreases in correlations between logic and other creativity variables (reported after Tables 4 and 5).

The implication of the threshold hypothesis for arts curricula is that critical and creative thinking components should be separated. In the present study deductive and class-reasoning skills were possessed by 90% of students in

the AP classes, 60% of students in college-bound classes, but less than 20% in the low-level class. If arts were taught as creative activities to students in the general curriculum, it is clear than many students would not possess the prerequisite reasoning skills. It would seem far better for general curriculum arts courses to develop critical thinking and expressive problem solving skills, and for specialized elective courses to develop creative thinking in addition, a suggestion consonant with discipline-based art education, or DBAE (Clark, Day, and Greer, 1987).

The separation of critical and creative thinking components also renders unlikely the controversial development of purely creative dispositions through the general curriculum. The negative correlations between the "business operations" type and both the arts orientation and artistic achievements (Table 3) are evidence that "conventional" individuals prefer explicit, systematic, and ordered activities to those that are ambiguous, free, exploratory, and unsystematized (cf. Hall and MacKinnon, 1969; Welsh, 1975). Instruction in critical thinking skills would not be inconsistent with preferences for structure, and expressive problem solving exercises would fall short of cultivating a creative disposition such as

"openness to experience." Openness to experience, although modestly correlated with divergent thinking (McCrae, 1987), would more likely be a by-product of creative-thinking than expressive-problem-solving exercises.

The results also support the problem finding and solving approach to methods of arts study and instruction. Pariser (1983) has defended the view that the arts may be studied and taught as problem-solving processes. There is much in the results to support this view, especially for the domains of literature and art. Although creative thinking was closely related to divergent thinking through overlapping measurement techniques, the addition of problem finding to expressive problem solving strengthened the relationship of expressive problem solving to the arts orientation and apparently weakened its relation to the technical orientation, as theory might predict.

Logic, problem finding and expressive problem solving all appear to be associated with the artistic personality and artistic achievements. These skills seem to play a role in the creative process, and the study results support methods in arts education which develop them. These methods range from "brainstorming" (recommended by the NCTE) as a form of expressive problem solving in language arts to

"tutored images" to promote critical and expressive problem solving in DBAE (Rush, 1987). Methods which promote problem setting in any creative domain are still difficult to find.

The absence of significant relationships between cognitive skills and three domains of artistic behavior (also reported by Runco, 1986) does not necessarily undermine the need for problem finding and solving methods in these areas; however, the absence of correlations does warrant explanation. The most parsimonious explanation is that problem solving does not play a role at all levels of artistic performance, even though it may play a role in all domains. In particular, proficiency in music, the performing arts and crafts may call for mastery of psychomotor skills rather than for what Simpson (1972) has called "origination." Origination involves creating new performances (e.g., choreographing a dance or composing music) after mastering prerequisite skills. Responses from subjects to Music, Performing Arts and Crafts items at the mastery level of performance (e.g., held a recital, had a dramatic role, or made a craft out of metal) seemed to outweigh responses at the origination level, resulting in diminished correlations between thinking skills and these domains of creative behaviors.

Future work on the relationships between creativity and cognition may want to include aesthetic-preference variables and focus on finer-grained analyses of cognitive skills. Some of this work may proceed through the standard approach of educational psychology, which includes a minimum sample size for parametric statistics, but other work may proceed through small samples and even case studies to describe the development of highly talented individuals. It is hoped that both types of study will contribute to a psychological base for arts education as arts education moves into the general curriculum.

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Table 1
Means, SDs, and Alpha Coefficients of Study Measures

Measure	Means	SD	r
ACT Interest Scales (stanines)			
Science	5.62	2.15	.95
Creative Arts	5.55	1.93	.92
Social Service	5.78	1.95	.71
Business Contact	5.89	1.88	.81
Business Operations	4.92	2.28	.90
Technical	4.37	2.25	.91
Cognitive Skills			
Logical	26.48	4.65	.76 (.66)
Insightful	6.45	3.27	.71 (.75)
Creative	21.66	8.35	.65 (.75)
Divergent	18.77	7.13	.84 (.82)
Creative Behaviors			
Literature	6.46	4.47	.80
Music	3.37	3.31	.77
Performing Arts	2.85	3.43	.71
Art	3.78	2.82	.70
Crafts	13.31	6.24	.79
Science	2.74	2.22	.54

Note: Values for subsample (N = 35) in parentheses.

Table 2

Intercorrelations of Cognitive Skills

Cognitive Skills	Insightful	Creative	Divergent
Logical	.60 (.55)	.39 (.19)	.37 (.05)
Insightful		.28 (.14)	.15 (-.13)
Creative			.76 (.75)

Note: With N = 65, .25 is significant at the .05 level, .32 at the .01 level, and .40 at the .001 level of a two-tailed test. Values for subsample (N = 35) in parentheses.

Table 3

Correlations Between Personality Orientations and Creative Behaviors (N = 65)

Creative Behaviors	Personality Orientations					
	Science	Arts	Service	B. Contact	B. Operation	Technical
Literature	.07	.36**	.04	-.10	-.25*	-.06
Music	.19	.39**	.01	-.07	-.11	-.05
Performing A.	.29*	.35**	.38**	.01	-.23	.05
Art	.13	.38**	-.01	-.20	-.29*	.19
Crafts	.26*	.34**	.23	.10	-.08	.26*
Science	.24	.26*	-.22	.05	.06	.19

*p<.05. **p<.01.

Table 4

Correlations Between Personality Orientations and Cognitive Skills (N = 65)

Cognitive Skills	Personality Orientations					
	Science	Arts	Service	B. Contact	B. Operation	Technical
Logical	.15	.37**	.11	.03	-.05	.11
Insightful	.08	.20	-.27*	-.14	-.02	.11
Creative	.21	.35**	.10	.16	-.04	.31*
Divergent	.13	.31*	.18	.19	.02	.38**

*$p<.05$. **$p<.01$.

Table 5

Correlations Between Cognitive Skills and Creative Behaviors (N = 65)

Cognitive Skills	Creative Behaviors					
	Literature	Music	P. Arts	Art	Crafts	Science
Logical	.25*	.17	.13	.26*	.08	.31*
Insightful	-.01	.23	-.01	.18	-.18	.34**
Creative	.36**	.14	.14	.40***	.22	.34**
Divergent	.44***	.13	.16	.47***	.37**	.43***

*$p<.05$. **$p<.01$. ***$p<.001$.